

Notes on *Thalassodes*-group of moths (Geometridae, Geometrinae) from Taiwan, with description of a new species

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Abstract All the species of *Thalassodes*, *Orothalassodes* and *Pelagodes* from Taiwan are listed. *T. immissaria intaminata* Inoue is upgraded to a valid species, a new species, *O. pervulgatus*, is described. *T. opalina* Butler is newly recorded from Taiwan. *P. falsaria* (Prout) is withdrawn from the fauna of Taiwan and transferred to *Orothalassodes*.

Key words *Thalassodes*, *Orothalassodes*, *Pelagodes*, Taiwan, upgrade, genitalia, 8th abdominal sternite & tergite.

I listed five species of *Thalassodes* from Taiwan (Inoue, 1992: 121): *subquadrarius* Inoue, *antiquadrarius* Inoue, *proquadrarius* Inoue, *falsarius* Prout and *immissarius* (sic!) *opalinus* Butler. Holloway (1996) divided *Thalassodes sensu* Prout (1912, 1933) into three genera mainly based on male genitalic characteristics: *Thalassodes* Walker, *Orothalassodes* (new genus) and *Pelagodes* (new genus). The former three species cited above were transferred to *Pelagodes* by him.

In this paper all the species of the three genera from Taiwan will be listed, with description of a new species, *Orothalassodes pervulgatus*, from southeast Asia including Taiwan; *Thalassodes opalina* Butler will newly be added to the fauna of Taiwan. *T. immissaria intaminata* Inoue will be upgraded to a species. *Thalassodes falsaria* Prout was placed in *Pelagodes* by Holloway, but it will be transferred to *Orothalassodes*, and removed from the fauna of Taiwan because it was recorded from this locality by Prout (1914) on the basis of misidentified specimens.

Unless otherwise stated, all the specimens recorded in this paper are in my private collection. Acronym: BMNH=The Natural History Museum, London.

In writing this paper I express my thanks to Mr K. Yazaki, Tokyo, for his permission in examining his private collection including genitalia slides and to Dr M. Owada, National Science Museum, Tokyo, for taking microphotographs of genitalia illustrated in this paper. In examining the rich collection of the three genera at BMNH the late Mr D. S. Fletcher kindly helped me in various ways. I am grateful for his assistance.

Thalassodes opalina Butler (Figs 1, 2)

Thalassodes opalina Butler, 1880: 214; *id.*, 1886: 70, pl. 117: 9; Prout, 1912: 152; Holloway, 1996: 255.
Thalassodes immissaria opalina: Prout, 1933: 100, pl. 11: i.

The genitalia of this species have not been described.

Male genitalia (Fig. 11). A spine-like process at tip of juxta, sacculus swollen, then strongly compressed, a slender spine at ventral corner of valvula. Aedeagus slender, two spined cornuti, one of them more slender than the triangular one. 8th abdominal sternite bilobed, centre sclerotized, minutely bicorniculate, tergite shallowly bilobed.

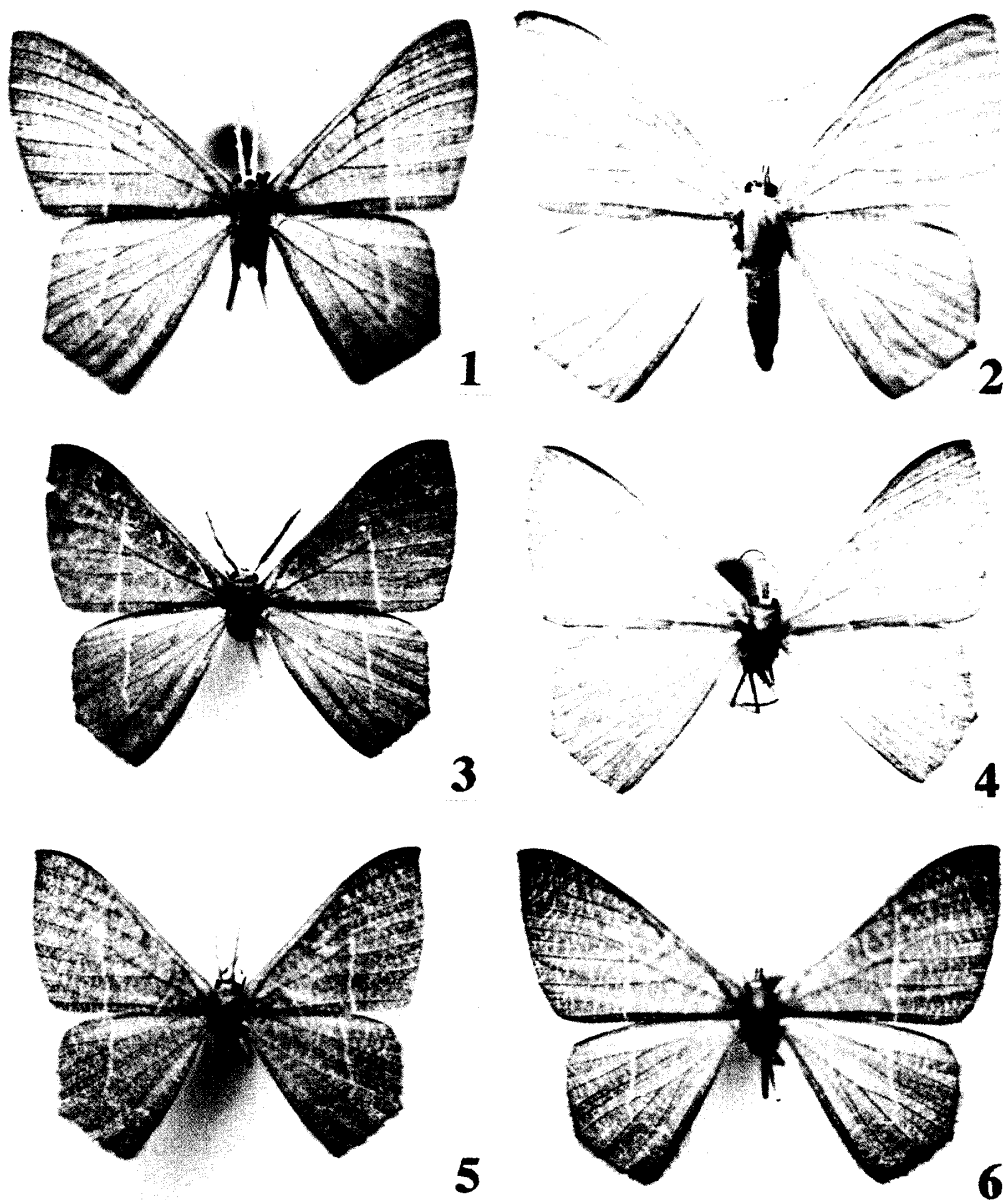


Fig. 1. *Thalassodes opalina* Butler, ♂ (wingspan 30 mm). 2. *Ditto*, ♀ (32 mm). 3. *Orothalassodes falsaria* (Prout), ♂ (27 mm). 4. *Ditto*, ♀ (28 mm). 5. *O. pervulgatus* sp. nov., holotype ♂ (25 mm). 6. *Ditto*, paratype ♀ (31 mm).

Female genitalia (Fig. 14) are almost identical to those of *opalinoides* Holloway (Holloway, 1996, fig. 288).

Specimens examined. 2 ♂, including the holotype, from Darjeeling and genitalia slides (Geom. 4106, 4119), in coll. BMNH. Khasia Hills, 94-189, 1 ♂. Taiwan: Chihpen Spa, 200 m, Taitung, 1 ♂. Thailand: Doi Suthep, Chiang Mai, 2 ♂. Females are omitted.

Distribution. NE India, N Thailand (new record), Taiwan (new record).

***Thalassodes intaminata* Inoue, stat. nov.**

?*Thalassodes immissaria opalina* (part.): Prout, 1933: 100, *nec* Butler, 1880.

Thalassodes immissaria intaminata Inoue, 1971: 144, pl. 6: 49, 50; *id.*, 1982: 1: 433, 2: pl. 58: 23–25, pl. 316: 10–12.

Thalassodes immisarius (*sic!*) *opalinus*: Inoue, 1992: 121, *nec* Butler, 1880.

Closely similar to *T. immissaria* Walker (the reference to the page of the original description should be 553, not 583 as in Holloway, 1996) from Sundaland, Sri Lanka, Thailand (new record), but readily distinguished from it by the male genitalia (Figs 8–10): a tongue-like process dorsal to the sacculus in *immissaria* (Fig. 7) (Holloway, 1996, fig. 287) is replaced by a horn-like process or a triangular plate of various shapes. One of the cornuti is triangular, larger than in *immissaria*. 8th abdominal sternite with distal margin much more widely and deeply excavated, side processes stronger than in *immissaria*.

Female genitalia (Fig. 17). Ductus bursae nearly as long as diameter of corpus bursae, while in *immissaria* (Fig. 16) it is much longer.

Specimens examined. Numerous specimens from Kyushu, adjacent Islands and Ryukyu Islands, Taiwan, Thailand, Philippines (Luzon), Sumatra.

Distribution. Japan, Taiwan, Thailand (new record), Philippines (new record), Sumatra (new record).

In this species the process at the extension of the sacculus in the male genitalia is extremely variable: in the majority of the specimens dissected by me it is a slender horn-like process (Japan, Taiwan, Thailand, Sumatra, Luzon), in some specimens a large triangular plate (Luzon only), but in a few specimens of a nearly intermediate shape (Taiwan, Luzon). In the female the shape of the genitalia is constant.

I suspect that some specimens of this species are included among the specimens of *immissaria* examined by Holloway (1996). In my collection there are one male each of *immissaria* from Thailand (new record), Sumatra and Borneo.

Tominaga (2000) recorded eight species of plants as larval foods and he (2003a) added *Bischofia javanica* (Euphorbiaceae) in Okinawa.

***Orothalassodes falsaria* (Prout), *comb. nov.* (Figs 3, 4)**

Thalassodes falsaria Prout, 1912: 153; *id.*, 1914: 239; *id.*, 1933: 100, pl. 11: i.

Pelagodes falsaria: Holloway, 1996: 265, fig. 308, pl. 10: 24.

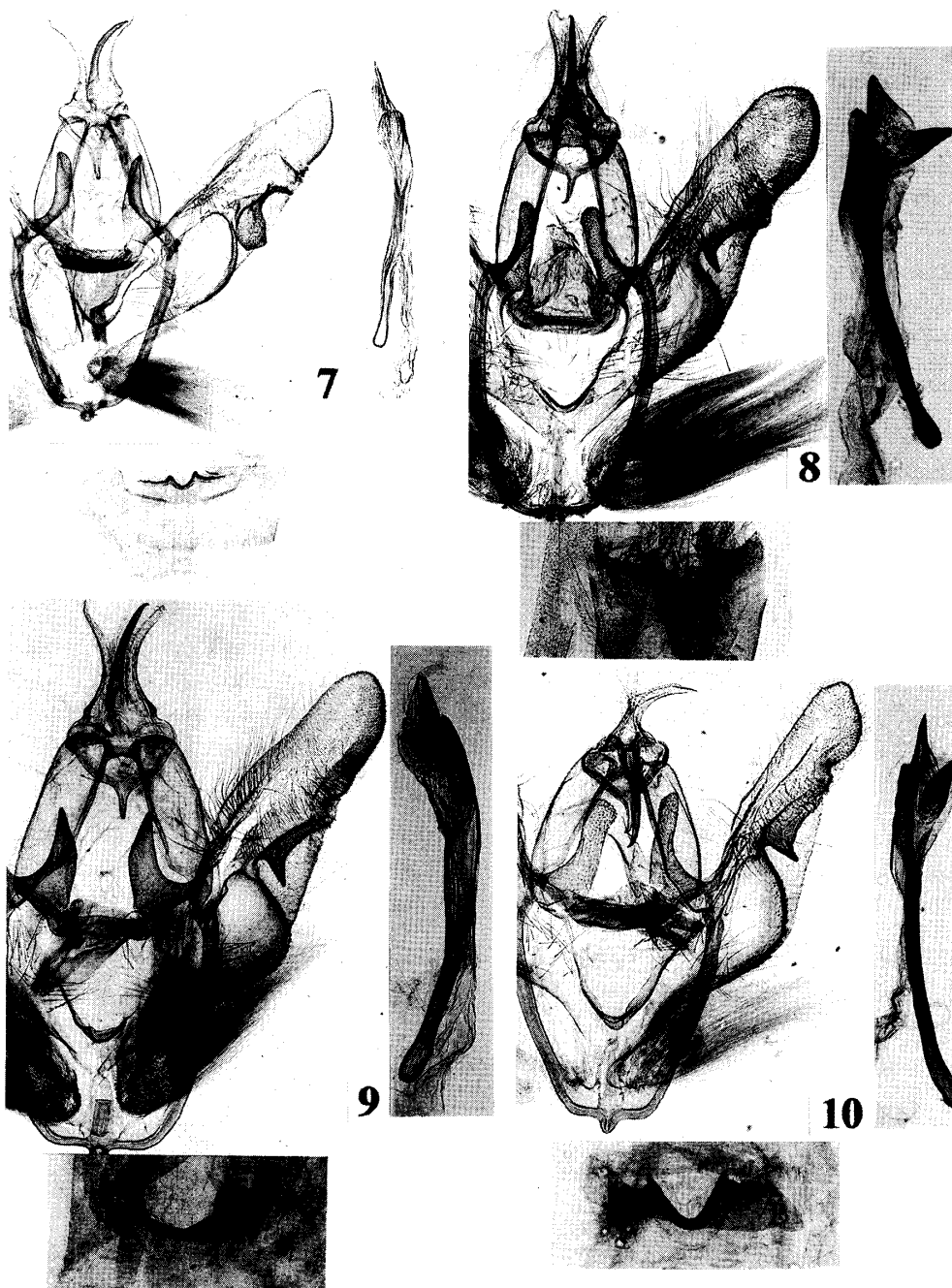
Thalassodes griseifimbria Prout, 1937: 179.

Thalassodes dissita: Holloway, 1976: 62, fig. 421, *nec* Walker, 1861.

This species was recorded from Taiwan by Prout (1914, 1933), but it was apparently based on a misidentification and therefore it must be omitted from the list (Inoue, 1992). *T. falsaria* was placed in *Pelagodes* by Holloway, but its genitalia and the shape of the male abdominal sternite and tergite are quite distinct from typical *Pelagodes* and it is better to transfer it to *Orothalassodes*.

Male genitalia (Fig. 12). The costa of the valva lacks an arm-like process, which is developed in most species of *Pelagodes*, but is rarely vestigial: in this species the costa is smooth and protuberant at middle, and the sacculus has a strongly sclerotized dentate margin. The cornuti consist of a horn-like process and a thinly sclerotized plate. The 8th abdominal sternite is widely sclerotized, its margins produced into lobes, and the tergite biangulated. In most species of *Pelagodes* antler-like coremata are developed, but are rarely vestigial, and the tergite is not specialized.

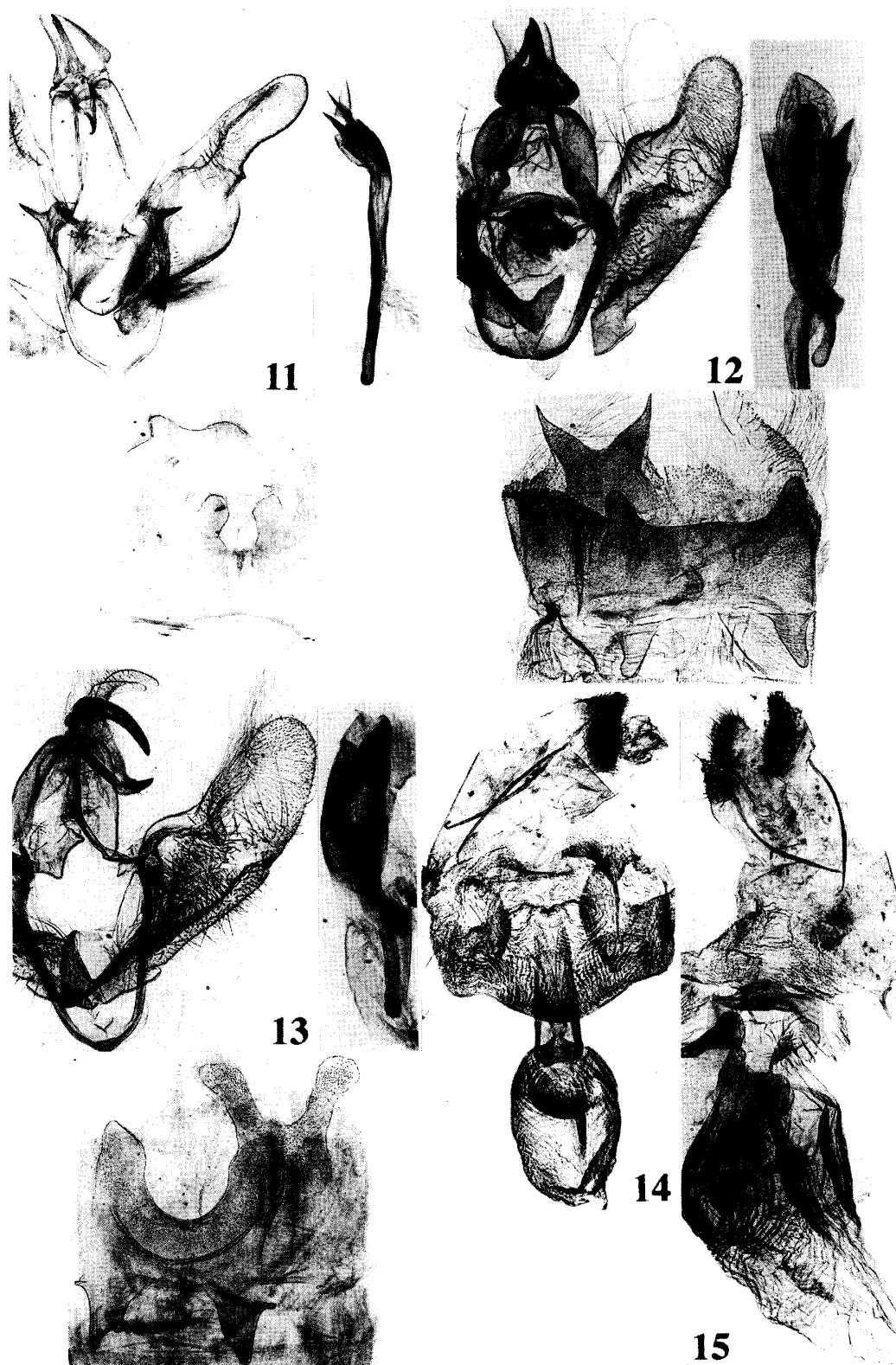
Female genitalia (Fig. 15). The true female genitalia will be shown here, because those



Figs 7–10. Male genitalia & margin of 8th abdominal sternite of *Thalassodes* spp. 7. *T. immissaria* Walker from Sumatra (HI slide 17390). 8. *T. intaminata* Inoue from Iriomotejima (HI Slide 17822). 9. *Ditto* from Taiwan (HI slide 17349). 10. *Ditto* from Luzon (HI slide 17678).

shown in Holloway (1996, fig. 313) are of a different species. The lamella antevaginalis has a band-like sclerotization, the ductus bursae is extremely short, and the corpus bursae ovate or nearly fusiform, with more than ten stripe-like sclerites along the wrinkles at middle.

Specimens examined. The holotype, ♂, of *falsaria* from the Khasia Hills and its genitalia slide (Geom. 4091) and the holotype, ♂, of *griseifimbria* from Bali and its genitalia slide (Geom. 4090), in coll. BMNH. 16 ♂♀ from Peninsular Malaysia, Sumatra and Borneo.



Figs 11–15. Male genitalia and 8th abdominal sternite & tergite (11–13) and female genitalia (14, 15). 11. *Thalassodes opalina* Butler (HI slide 16309). 12. *Orothalassodes falsaria* (Prout) (HI slide 17297). 13. *O. pervulgatus* sp. nov. (HI slide 17285). 14. *T. opalina* Butler (HI slide 17310). 15. *O. falsaria* (Prout) (HI slide 17414).

Distribution. NE India, Peninsular Malaysia, Sumatra, Borneo, Java, Bali.

***Orothalassodes pervulgatus* sp. nov.** (Figs 5, 6)

Size nearly identical with *falsaria*, lighter blue green, both wings densely striated with white. In fresh specimens frons green, much lighter than in *falsaria*.

Male genitalia (Fig. 13). Valva with a strongly swollen costa, sacculus with strongly sclerotized but minutely dentate linear margin. A triangular process arising from side of transtilla. Aedeagus with basal half slender but apical half thick, containing two stick-like cornuti produced from a roundish wrinkled mass of sclerite. Both abdominal sternite and tergite bilobed, the former more widely expanded and more strongly sclerotized, cephalic corners produced.

Female genitalia (Fig. 18). Ductus bursae sclerotized, cylindrical, nearly as long as ovate corpus bursae. Signum absent.

Specimens examined. Holotype, ♂: Darjeeling, Mangpu, 700 m, 1. iv. 1986 (W. Thomas), in coll. BMNH. Paratypes. 77 ♂ ♀ from: Pakistan: Margala Hills, Islamabad. India: type-locality; Bhimtal, Uttar Pradesh; Gudalur, 1,200 m, Nilgiri Hill. Nepal: Bodha Village; Kathmandu, 1,300 m. Thailand: Doi Suthep; Doi Chang Khian, 1,250 m, Chiang Mai. N Vietnam: Tam Dao, 800 m. Philippines: Banaway, Ifgao, Luzon. Taiwan: Lalashan, Wulai; Wushe, 1,000 m; Lishan; Lushan Spa; Chihpen; Hungyeh Spa, 200 m; Wenshan Spa, 580 m; Fenchihu, 1,600 m; Alishan, 2,200 m.

Distribution. Pakistan, NE India, Nepal, Thailand, Vietnam, Taiwan, Philippines (Luzon).

Probably this species was confused with *falsaria* by Prout. I found one female (genitalia slide Geom. 4142) of this species identified as *falsaria* at BMNH.

The following three species of *Pelagodes* were already recorded from Taiwan and moths and genitalia of both sexes were illustrated by me.

***Pelagodes subquadraria* (Inoue)**

Thalassodes subquadraria Inoue, 1976: 7, figs 1–3; *id.*, 1982: 1: 433, 2: pl. 52: 17, 18, pl. 316: 1–3.

Thalassodes subquadrarius: Inoue, 1992: 121.

Pelagodes subquadraria: Holloway, 1996: 261.

Various localities of Taiwan were recorded in the original description.

Food plant. *Cinnamomum camphora* (Lauraceae).

Distribution. Japan (Honshu, Shikoku, Kyushu, Tsushima, Yakushima, Okinawa), Taiwan, China.

***Pelagodes proquadraria* (Inoue)**

Thalassodes proquadraria Inoue, 1976: 9, figs 7–9; *id.* 1982: 1: 433, 2: pl. 58: 21, 22, pl. 316: 7–9.

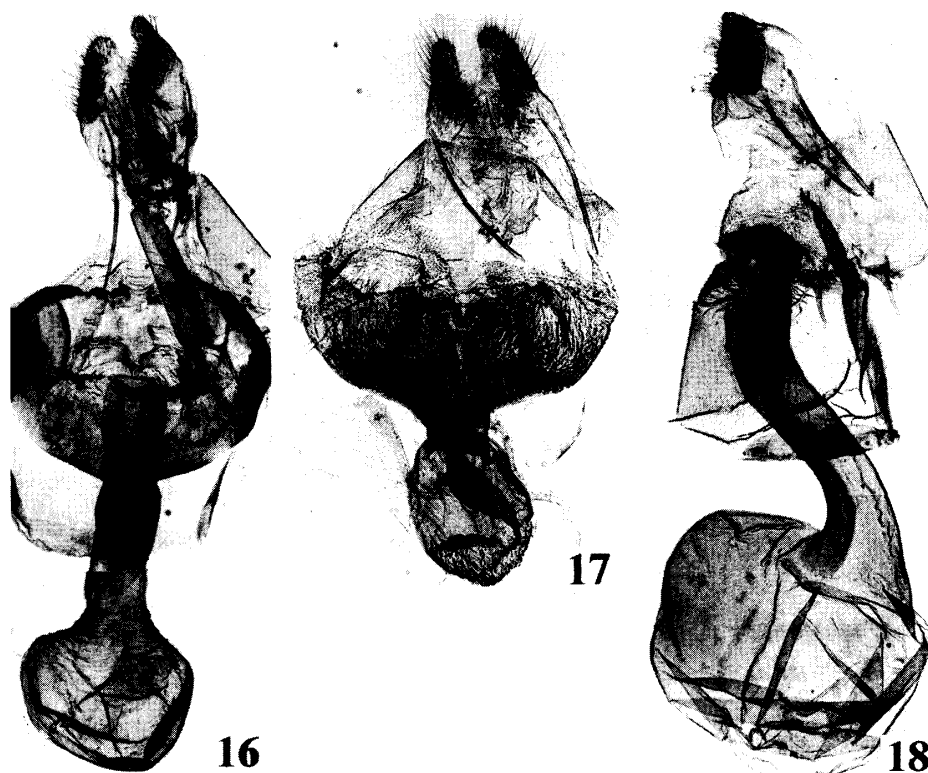
Thalassodes proquararius: Inoue, 1992: 121.

Pelagodes proquadraria: Holloway, 1996: 261.

Only one locality of Taiwan, Mt Nengkao, was recorded in the original description.

Food plant. *Macaranga tanarius* (Euphorbiaceae) (Tominaga, 2003b).

Distribution. Japan (Okinawa, Miyakojima, Ishigakijima, Iriomotejima), Taiwan, NE India.



Figs 16–18. Female genitalia. 16. *Thalassodes immissaria* Walker (HI slide 17472). 17. *T. intaminata* Inoue (HI slide 17823). 18. *Orothalassodes pervulgatus* sp. nov. (HI slide 17286).

Pelagodes antiquadraria (Inoue)

Thalassodes antiquadraria Inoue, 1976: 9, figs 4–6; *id.*, 1982: 1: 433, 2: pl. 56: 19, 20, pl. 316: 4–6.

Thalassodes antiquadrarius: Inoue, 1992: 121; *id.*, 1994: 198, figs 2A–D.

Pelagodes antiquararia: Holloway, 1996: 261; Inoue, 1998: 278.

Wushe, Taiwan, was recorded in the original description and the Ogasawara Islands were added (1994).

Schima mertensiana (Theaceae) was recorded by Inoue (1998) as a larval food plant from Ogasawara and *S. wallichii liukuensis* was recorded by Tominaga (2000) from Okinawa but erroneously for *P. proquadraria*.

Distribution. Japan (Amami-Oshima, Okinawa), Taiwan, China, Thailand, Nepal, NE India.

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摘 要

台湾産 *Thalassodes* グループについて (シャクガ科アオシャク亜科) (井上 寛)

私 (1992) は台湾産として *Thalassodes* を 5 種リストした。その後 Holloway (1996) によって主にゲニタリアからこの属は *Thalassodes*, *Orothalassodes* および *Pelagodes* の 3 属に分割された。

T. falsaria Prout (1912) は Prout (1914) によって台湾から記録されたが、誤同定によることは確実なので台湾のリストから除外しなければならない。Holloway (1996) は本種を *Pelagodes* に入れたが、私はゲニタリアと雄第 8 腹板および背板の形から *Orothalassodes* に移した。*Thalassodes opalina* Butler を今回新たに台湾から記録した。従来 *T. immissaria* の亜種 *intaminata* Inoue とされていたサザナミシロアオシャクは今回独立種とした。雄の交尾器や第 8 腹板の形に違いがあるし、雌では ductus bursae がはるかに短い。*Orothalassodes pervulgatus* という新種を台湾ほか東南アジア各地産の標本によって記載した。

Pelagodes の 3 種: *P. subquadraria* (Inoue) クスアオシャク, *P. proquadraria* (Inoue) ヒメサザナミアオシャク, *P. antiquadraria* (Inoue) オオサザナミアオシャクは日本にも台湾にも分布していて特に問題はない。これら 3 種とサザナミシロアオシャクの幼虫や食草については富永 (2000, 誘蛾燈 (159); 2003a, b, 同上 (173), (174)) を参照されたい。

本文に取り上げた 3 属は男性名詞なので、命名法では種名や亜種名の形容詞語尾を *-us* にしなければならないのだが、最近多くの学者 (ことに英語圏) は原記載のときのスペルをそのまま引用しているので、本文でもそれに従った。

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